MITIGATION GUIDELINES AND MONITORING REQUIREMENTS

Interested parties are hereby notified the following Mitigation Guidelines and Monitoring Requirements will be applied throughout the Portland District (District) of the U.S. Army Corps of Engineers (Corps). The District encompasses the State of Oregon and State of Washington Ports located on the Columbia River from the Port of Ilwaco to Port of Klickitat.

Corps and U.S. Environmental Protection Agency (EPA) regulations (33 CFR 320-330 and 40 CFR 230) authorize the Corps to require compensatory mitigation for unavoidable impacts to wetlands and other jurisdictional "waters of the U.S." The Corps is aware of challenges associated with past compensatory mitigation sites and is committed to improving the success of future compensatory mitigation projects. These Mitigation Guidelines and Monitoring Requirements are designed to assist the regulated public with all aspects of the mitigation process and to provide information to ensure future compensatory mitigation sites successfully replace lost functions and values associated with regulated impacts to waters of the U.S.

These Guidelines are to be applied by the regulated public and by Regulatory Branch Project Managers for activities within the Portland District. These Guidelines were developed in conjunction with EPA, U.S. Fish and Wildlife Service (FWS), National Oceanic and Atmospheric Administration- National Marine Fisheries Service (NOAA Fisheries) and other resource agencies using experience, and field investigations. The Guidelines aim to improve the success of compensatory mitigation projects.

I. INTRODUCTION

A. PURPOSE

These Guidelines outline the approach the regulated public will follow in examining mitigation for project impacts, guidance on preparing compensatory mitigation and monitoring plans for unavoidable impacts to the aquatic environment including development of performance

standards and final success criteria, and the elements required to prepare monitoring reports for compensatory mitigation sites. This document is divided into two parts to address the difference between mitigation and monitoring.

The Mitigation Guidelines (Section II) have been prepared using experience of District and other federal resource agency staff and published scientific data. This information is intended to assist the regulated public in preparing adequate compensatory mitigation and monitoring plans and implementing successful compensatory mitigation projects.

The second part of the document (Section III) focuses on Monitoring Requirements. Monitoring reports will be submitted to the Corps in all cases where the Corps requires the construction of compensatory mitigation projects. A well-conceived and executed monitoring program is essential to identify and remedy problems that can reduce the success of compensatory mitigation projects. All compensatory mitigation projects will be subject to compliance inspections by Corps Project Managers.

B. MITIGATION POLICY

The Corps and the EPA formulated policy and procedures to be used in determining the mitigation necessary to demonstrate compliance with the Clean Water Act Section 404(b)(1) Guidelines (40 CFR 230) (the Section 404(b)(1) Guidelines). This information is set forth in the "Memorandum of Agreement

(MOA) Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines," dated February 7, 1990 (the Mitigation MOA).

The Section 404(b)(1) Guidelines limit the issuance of a permit to the activity or project design representing the least environmentally damaging practicable alternative (LEDPA) that is not contrary to the public interest. More specifically, the Section 404(b)(1) Guidelines state that no discharge of dredged or fill material shall be permitted if there is a practicable alternative available to the proposed discharge with less adverse impact on the aquatic ecosystem, if the alternative does not have other significant adverse environmental consequences. Practicability is defined in terms of cost, logistics, and existing technology in light of the overall project purpose. The burden to demonstrate compliance with the Section 404(b)(1) Guidelines rests with the permit applicant. For non-water dependent discharges into special aquatic sites, there is a presumption that less environmentally damaging practicable alternatives are available. If the applicant has complied with the Guidelines by first evaluating alternatives that would avoid impacts, and then taken appropriate and practicable steps to minimize adverse impacts to the maximum extent practicable, then compensatory mitigation is required for the unavoidable impacts.

Even in cases where a Corps-notifying General Permit (Nationwide Permit or Regional General Permit pursuant to 33 CFR 330) applies, the applicant will have to demonstrate avoidance and minimization of aquatic resource impacts. Granted, the demonstration required is typically less rigorous than for a Standard Permit. Nevertheless, if an applicant is required to notify the Corps regarding authorization under an existing General Permit, it is likely the Corps's verification letter/notice to proceed will require compensatory mitigation. Clearly, the sequence of avoidance, minimization, and compensatory mitigation specified by the Section 404(b)(1) Guidelines and the Mitigation MOA is fundamental to the administration of the Corps' regulatory program.

C. CORPS POLICY

As stated in the Mitigation MOA, the goal of the Clean Water Act and the Section 404(b)(1) Guidelines is to maintain and to restore the physical, chemical, and biological integrity of the Nation's waters. The Corps strives to avoid or minimize adverse impacts to waters of the U.S., and to achieve a goal of no net loss of wetland functions and values. To achieve these goals, compensatory mitigation is generally required at a minimum 1:1 replacement ratio. In the past, the Corps has accepted acreage as a surrogate for functions and values because the former parameter is easier to measure. The proliferation of habitat assessment tools in recent years has allowed the Corps to utilize estimates of functions and values increasingly to determine replacement ratios. The replacement or mitigation ratio is often increased in consideration of a number of factors, including the scarcity and quality of the habitat to be impacted in consideration of the region or watershed, any temporal loss of aquatic habitat functions and values caused by a delay in the construction of a compensatory mitigation site, the cumulative effects of that portion of the project in the Corps' scope of analysis in the context of past and reasonably foreseeable projects in the region or watershed, the use of a long-term irrigation strategy as a replacement for natural hydrologic processes, and the inclusion of an adequate margin of safety to reflect the expected degree of success associated with the compensatory mitigation plan.

Even with a margin of safety, compensatory mitigation often does not replace all functions and values lost at the impact site. Results from several studies as well as the experience of regulators throughout the U.S. underscore the importance of including an adequate margin of safety in determining the replacement ratio. The margin of safety included by the Corps can be reduced by completing compensatory mitigation in advance of, or concurrently with, the impact; demonstrating the success of past compensatory mitigation sites; showing the proposed compensatory mitigation will result in more overall benefit to the region or watershed to which the proposed impact site contributes; and ensuring the compensatory mitigation sites

are protected from subsequent loss or degradation (e.g., inclusion of permanent vegetated buffers around the site).

The Corps recognizes on-site compensatory mitigation is not always practicable or "best" for the aquatic resources. In many cases, sites elsewhere in the region or watershed offer higher potential gains in functions and values. The Corps' Regulatory Branch is striving to transition from the historic paradigm of "piece-meal" or project-by-project permitting and mitigation decisions to a watershed or holistic approach. Toward this end, the Corps is more involved in working with the public to develop mitigation banks and in-lieu fee mitigation programs, which offer means of compensating for individual project impacts on a larger scale. The Corps favors the use of approved mitigation banks or in-lieu fee programs in cases where they result in more regional or watershed benefit than on-site compensatory mitigation.

The District is considering the possibility of using a fee-in-lieu program to satisfy compensatory mitigation requirements within the District. There are six existing mitigation banks approved by the District for sales of credit.

The applicant should contact the Corps as early in the project development process as possible. The applicant should never purchase sites or finalize plans before the Corps has reviewed and approved of the compensatory mitigation concept. It is important to note that payments made prior to the Corps permit decision are generally considered "sunk" costs, and regulatory guidance requires Corps Project Managers exclude these costs in the evaluation of the practicability of a project or the associated compensatory mitigation plan. Likewise, payments by developers to an Assessment District, which can be based on assumptions of the number of housing units per area, to facilitate construction of schools, roads, and other infrastructure are generally treated by the Corps as "sunk" costs in evaluating practicability of project alternatives. These assumptions are speculative and are often determined without consulting with the regulatory agencies to determine if they are permittable in consideration of the environmental resources potentially present.

Compensatory mitigation may be required for most Corps authorizations. For Standard Permit applications, the applicant can submit a conceptual mitigation plan along with the formal application materials. This plan should focus on discussing the mitigation concept(s); not providing a fully developed mitigation and monitoring plan with implementation, maintenance, and monitoring protocols. It should include a summary of how on-site impacts would be avoided and minimized, and why the applicant believes the remaining, proposed impacts would be adequately compensated. Generally, a fully developed draft compensatory mitigation and monitoring plan should not be prepared until the Corps has accepted a final jurisdictional map, which must also identify project impacts, and has agreed the conceptual mitigation plan would likely compensate for the proposed impacts. At this juncture, the Corps will typically discuss with one or more of the resource agencies the likely efficacy of the proposed compensatory mitigation. In general, the final compensatory mitigation and monitoring plan should not be submitted until after public comment period closes and the Corps has made a preliminary determination of compliance with the Section 404(b)(1) Guidelines. For Letters of Permission, the Corps may or may not require compensatory mitigation; the Corps should be contacted prior to the submittal of an application to determine if compensatory mitigation would likely be required. If an applicant requests verification of a project's authorization under an existing Nationwide Permit or a Regional General Permit, and proposes compensatory mitigation, a draft compensatory mitigation and monitoring plan must be submitted with the request for verification. The applicant should contact the Corps as soon as possible to ascertain whether compensatory mitigation will be required.

The final submittal of a compensatory mitigation and monitoring plan should be in a SINGLE document. It should contain up-to-date versions of all materials, even if other versions were submitted

earlier in the application process. It should include the preparer's identity (if not the applicant) and the date of the final submission.

D. PROTECTION OF COMPENSATORY MITIGATION SITES

The Corps may require in-perpetuity protection of compensatory mitigation sites. The decision whether to require in-perpetuity protection has been based on several factors, such as the quantity and quality of the resources at the impact site and the compensatory mitigation site, and their importance to the region or watershed. Regulatory Guidance Letter 02-2, issued December 24, 2002, encourages in-perpetuity protection for compensatory mitigation sites. The Corps will continue to require in-perpetuity protection for compensatory mitigation sites when appropriate. In-perpetuity protection typically occurs through the recordation transfer of title to an approved land trust, a conservation easement or a deed restriction, or in unusual cases, the recordation of a development's covenants, codes, and restrictions.

E. PERSONS TO CONTACT WITH QUESTIONS

For answers to questions regarding the interpretation of these Mitigation Guidelines and Monitoring Requirements or acceptable compensatory mitigation for a specific project, contact the Corps Project Manager responsible for your area of interest:

Portland District Office	(503) 808-4371 or (503) 808-4373
Eugene Field Office	(541) 465-6868
LaGrande Field Office	(541) 962-0401
Coos Bay Field Office	(541) 756-5316

The Corps Portland District Regulatory Branch website also provides important information regarding Corps jurisdiction, processing of permit applications, and mitigation:

https://www.nwp.usace.army.mil/op/g/

II. MITIGATION GUIDELINES

After the applicant has demonstrated maximum practicable avoidance and minimization of project impacts to waters of the U.S., the Corps will determine whether compensatory mitigation for the unavoidable impacts is required. There are often many options for providing compensatory mitigation but the applicant should investigate and consider Corps-approved mitigation banks and in-lieu fee programs serving the area where the proposed impacts would occur. On-site compensatory mitigation could be impracticable if the established, restored, enhanced, and/or preserved habitat would be isolated, of small acreage, or experience substantial changes in hydrologic condition over the long term. With many Corps-approved mitigation banks and in-lieu fee mitigation programs, the responsible entity (e.g., conservancy) has analyzed the type(s) of habitat and location(s) benefiting the region or watershed(s) within the bank or program's service area. In these cases, the purchase of mitigation credits in existing banks or the payment of in-lieu fees could provide a more practicable option, which could also enhance the regional or watershed's aquatic resources. However, the Corps will make the final decision whether to accept purchase of credits from a Corps-approved mitigation bank or in-lieu fee mitigation program, after examining all relevant habitat considerations, including landscape-level issues such as wildlife corridors and water quality.

Compensatory mitigation will proceed through several stages if satisfying the requirement involves the construction of a compensatory mitigation project. There are specific issues the applicant must address at each stage in the process to increase the probability of a successful compensatory mitigation project. The key stages in the development of a compensatory mitigation project are:

A. Project Site Impact Assessment

B. Compensatory Mitigation Site Selection

C. Compensatory Mitigation Site Design
D. Compensatory Mitigation Site Construction
E. Long-Term Compensatory Mitigation Site Maintenance and Monitoring

Within each of these areas, the Corps has identified concerns the applicant needs to consider when preparing draft and final compensatory mitigation and monitoring plans. The Corps strongly recommends all applicants follow the format of the attached Mitigation Plan Checklist. An Annotated Checklist is provided for additional background on what the Corps will consider during review of mitigation proposals.

A. Project Site Impact Assessment.

An important aspect of any permit application is the assessment of the project site before impacts occur. An adequate assessment of the current functions and values before the construction of the project is important for determining the relative importance of the aquatic resources to the site and to the region or watershed. Assessment results can provide a basis for modifying pre-construction plans to avoid and/or minimize impacts to these resources. This assessment should be completed before the proposed project is designed or the proposed compensatory mitigation site is selected.

The applicant will choose the site assessment method. A list of functional assessment methods will be available at on the Corps's Regulatory website (https://www.nwp.usace.army.mil/op/g/).

B. Compensatory Mitigation Site Selection

1. The selection of an appropriate site to construct a compensatory mitigation project has been one of the most neglected aspects of compensatory mitigation planning. In the past, many applicants have relied on project economics to choose compensatory mitigation sites, without considering the underlying physical characteristics. Site selection should include and prioritize, but not be limited to, the following criteria, which relate to aspects of the physical environment.

This guidance recognizes that in some circumstances wetlands must be actively managed to ensure their viability and sustainability. Furthermore, long-term maintenance requirements may be necessary and appropriate in some cases (e.g., to maintain fire-dependent plant communities in the absence of natural fires; to control invasive exotic plant species). Proposed mitigation techniques should be well-understood and reliable. When uncertainties surrounding the technical feasibility of a proposed mitigation technique exist, appropriate arrangements (e.g., financial assurances, contingency plans, additional monitoring) should be in place to increase the likelihood of success. Such arrangements may be phased out or reduced once the attainment of prescribed performance standards is demonstrated.

a. *Natural Hydrology*. The National Research Council's Compensating for Wetland Losses Under the Clean Water Act (2001) stated that hydrological conditions, including variability in water levels and flow rates, are the primary driving force influencing wetland development, structure, functioning, and persistence. Without a naturally variable source of water (e.g., stream, lake, tidal action), many of the hydrologic functions or processes will occur at low levels throughout the life of the habitat. Lack of a natural water source or hydrological equivalence between the impact site and the compensatory mitigation site has been the number one physical factor leading to the low rate of success of past compensatory mitigation projects.

Natural hydrology is the most important factor in the development of successful mitigation. Wetlands and other waters are very dynamic, and dependent on natural seasonal and yearly variations unlikely to be sustainable in a controlled hydrologic environment. Artificial structures and mechanisms should be used only temporarily. Complex engineering and solely artificial mechanisms to maintain water flow normally will not be acceptable in a mitigation proposal. In those sites where an artificial water source (irrigation) has been used to attempt to simulate natural hydrology there are several

problems that lead to reduced likelihood of success. First, artificial irrigation does not provide the dynamic and variable nature of water flow normally found in wetlands or riparian systems. Second, the lack of seasonal flows limits the transport of organic matter into and out of the wetland or riparian system. Without any inflow, the net result of artificial irrigation is transport of organic material out of the system. Third, depending on the timing, the use of flood or sprinkler systems on newly created or restoration sites often promotes the germination and growth of exotic plant species.

Natural hydrology can be exceedingly difficult to establish. The successful determination of proper hydrology will require analysis of existing conditions in reference sites and hydrologic testing of the possible compensatory mitigation sites. This testing may include an examination of groundwater availability, frequency of flooding, depth/duration/timing of flooding, and determination of tidal ranges in estuarine and marine areas. Modification of hydrologic characteristics should be kept to a minimum with the stated goal to have the site be hydrologically and hydraulically self-sustaining and require little or no long-term maintenance. A reliable estimate of the water budget for the site is essential.

The Corps does not consider compensatory mitigation projects primarily supported by long-term irrigation to be viable mitigation projects. Therefore, applicants should weigh the potential investment costs of acquiring suitable land adjacent to existing channels, lakes, or other natural water feature for restoration or enhancement relative to establishment projects in upland environments, which will likely involve higher costs (considering the additional mitigation and the risk of failing to meet the Corps' success criteria). Applicants should carefully consider expanding efforts to avoid and minimize on-site impacts and to attempt to submit plans for self-sustaining compensatory mitigation sites along natural water features, such as stream channels. Applicants must weigh the potential investment costs of acquiring land suitable for restoration versus creation projects in upland environments that will likely involve higher long-term costs and greater risks of mitigation site failure.

Because compensatory mitigation sites primarily supported by long-term irrigation tend to be less successful, the Corps strongly discourages the use of long-term irrigation as the main water source. Short term (i.e., 1-3 years) irrigation sufficient to establish plant roots is not discouraged, and is, in some circumstances (e.g. arid environments), essential to establishing vegetation.

b. *Soil Characteristics*. Many past compensatory mitigation projects did not address the development of suitable soils. This neglect is somewhat understandable due to the varied nature of soils and the past emphasis on non-wetland compensatory mitigation. Examination of existing reference sites will provide important information on the development of suitable soils for future sites. It is also critical to understand that development of suitable soils is linked to the establishment of natural hydrology. In sites with long-term irrigation as the primary source of hydrology, the placement of large amounts of relatively clean water onto the site results in the net removal of organic material without replacement. This would slow the development of organic soils, which has been noted in several compensatory mitigation sites. If a goal of the compensatory mitigation project is wetland development, organic material will be necessary to foster the development of hydric soil indicators. Mycorrhizal soil injections should be considered in some cases, particularly where establishment projects are attempted in areas without appropriate soil conditions. In the case of in-kind compensatory mitigation for wetlands, soils from the impacted aquatic habitat should be collected and used at the compensatory mitigation site. It is also essential that soils at the compensatory mitigation site not be excessively compacted; excessive compaction can drastically limit plant growth. In some cases, it might be necessary to rip or scarify the soil after cessation of grading activities.

c. *Invasive plant species*. Invasive plants can be detrimental to a mitigation site. When selecting a site, investigate neighboring properties for the presence of non-native, invasive plant species. A characteristic of invasive plants is their ability to colonize an area and out compete native species.

Invasive species must be controlled within the mitigation site. An upstream site that is heavily infested with non-native, invasive plant species may provide a consistent source of invasive species to the proposed mitigation site and make attainment of success criteria difficult to achieve.

b. *Wildlife Corridors*. The goal is development of compensatory mitigation projects adjacent to existing high-functioning habitats. Even more desirable would be the construction of a compensatory mitigation site linking two or more habitats which had been previously separated. The use of spatial analysis tools (GIS) on a regional basis could provide valuable assistance in the choice of preferable locations for compensatory mitigation sites. The distance to the nearest area of native vegetation forming a contiguous link to larger habitat complexes would be an important consideration in the width of the corridor, the value of the habitat to the local wildlife, and the final mitigation ratio.

3. Generally, the physical characteristics of the sites considered determine whether establishment (i.e., creation), restoration, enhancement, or, more rarely, preservation are viable compensatory mitigation options. The categories of compensatory mitigation, as defined by Lewis (1990) are:

Restoration: return to a pre-existing condition.

Establishment (creation): conversion of a persistent non-wetland habitat into wetland (or other aquatic) habitat. Two subdivisions are recognized: Artificial (i.e., irrigation required) or self-sustaining.

Enhancement: increase in one or more functions due to intentional activities (e.g., plantings, removal of non-native vegetation, hydrologic manipulation).

Passive Re-vegetation: allow a disturbed area to naturally re-vegetate without plantings.

Regulatory Guidance Letter 02-2 uses the term establishment instead of creation. The former term will be used in this document for consistency with this Corps Headquarters' guidance. Restoration projects have the greatest potential of success because, in theory, the full suite of functions previously existed at the site. Establishment projects have the highest risks since establishing aquatic habitat in an area where it did not previously exist is a difficult proposition. Therefore, pure wetland creation will be evaluated using very stringent criteria before being approved for use as compensatory mitigation for project impacts. Some projects may include creation as part of an overall mitigation effort involving restoration, enhancement, and/or preservation (e.g., as in a proposed mitigation bank). In these cases, evaluation will be based on the entire proposal and its location in the watershed. Enhancement projects generally receive less compensatory mitigation credit, because enhancement targets particular functions instead of the full suite of functions performed by that habitat type. When enhancement is accepted, the Corps will require the enhancement improve as many of the functions as possible. Preservation as compensatory mitigation is rarely accepted unless it is combined with restoration, enhancement, or establishment projects sufficient to ensure "no net loss" of functions and values. Preservation is essentially avoidance, which is required under the Mitigation MOA and the Section 404(b)(l) Guidelines. Preservation is accepted on occasion, when particularly rare or valuable aquatic habitat is threatened by anthropogenic activities.

C. Compensatory Mitigation Site Design

1. Design of the compensatory mitigation project is highly dependent on the site selected. As discussed in the previous section, interaction with a natural source of hydrology is essential to the development of a high-functioning, sustainable compensatory mitigation site. Therefore, the design should focus on ensuring this interaction emulates what is occurring at reference (i.e., high-functioning) sites for the target habitat type(s) and not interfere with existing, adjacent water systems. The factors used in the preliminary design of the compensatory mitigation site should have a functional assessment basis. If the HGM Approach is used, the applicable Regional HGM Guidebook will provide most of the critical elements (system attributes or variables and functions) that need to be addressed for that habitat type in

the compensatory mitigation plan. If the variables or functions are included in the design, it will be much easier to develop success criteria for the final compensatory mitigation project.

2. There are several important features to any successful compensatory mitigation design or plan. Each aspect of the plan must be identified in detail and explained clearly. Although there may be variation in the number of items required for a particular plan, those identified below are considered the minimum items needed in a mitigation plan. When preparing a draft or final compensatory mitigation and monitoring plan, the Corps strongly recommends the regulated public follow the general format provided in the Mitigation Plan Checklist.

a. *Clearly define the purpose of the compensatory mitigation project*. The purpose of the compensatory mitigation project must be clearly identified and include specific statements about the type(s) of habitat (and associated functions and values) to be impacted by the construction project, the functions and values to be replaced at the proposed compensatory mitigation site, and any other desired functions and/or values (e.g., habitat for federally listed threatened or endangered species). Clearly written purpose statements will provide important information for the development of useful performance standards and success criteria and the approval of the compensatory mitigation and monitoring plan.

b. *Develop a comprehensive hydrology component*. This component should include information about any existing channels, historic flow rates, surface and groundwater level fluctuations, tidal regimes (if relevant), and topography of the compensatory mitigation site (i.e., before and after any proposed grading). Clearly identify the source(s), quality, and quantity of water including temporal aspects of any irrigation plan, which may be required in the first few years (i.e., short-term irrigation) of implementing the compensatory mitigation to foster vegetation establishment. Provide information about the average amount of water and the variability of this water available to the site during a standard year. If available, include information on the depth of the water table and its variability throughout the year. Project success depends on having sufficient knowledge about the depth, duration, and timing of water delivery to the compensatory mitigation site - will the water budget at the site support the intended habitat type(s)? This issue is especially important if wetland establishment is a goal.

c. *Develop a complete grading plan making use of the hydrology data.* Evaluate the grading plan for possible areas of scour and/or deposition of sediment. In many aquatic areas, such as riverine systems, scour and deposition are fundamental and dynamic processes and should not be precluded. However, it would be illogical to plant areas actively scoured or filled, such as an active stream channel. Modify the grading plan as necessary to establish areas for planting that are progressively less subject to regular scour (i.e., higher terraces or elevations) and deposition (use adjacent, less-disturbed habitat as a reference). For riverine habitat, secondary or higher-flow channels can also be excavated on terraces closer to the active channel. For estuarine marsh compensatory mitigation sites, changes in sea level (e.g., global warming) and subsidence (e.g., metabolism of soil organic matter) are key considerations for the long-term development and success of these sites. For all habitat types, plenty of micro- and macro-topographic variation should be incorporated into the design and specified in the grading plan; this variation is important to maximizing habitat variability. Again, examine adjacent or nearby less-disturbed habitat as a reference.

d. *Determine the Adequacy of the Soils to Support the Target Habitat Types*. Identify the soil type(s) onsite before and after grading. If establishment of jurisdictional wetlands is a goal, it is important to consider whether the soils are of the appropriate texture to support wetlands. Does the NRCS Soil Survey indicate hydric soils occur at the site, or that hydric soil inclusions can occur in the soil type(s)? If not, addition of clay or silt might be necessary to reduce the soil's permeability. Determine whether other soil amendments will be necessary for long-term habitat development (e.g., organic matter, nitrogen, etc.). If amendments will be required, determine the most effective methods of nutrient delivery over the long-term.

e. *Develop a draft plant palette based on the compensatory mitigation project purpose, soil types, and hydrology*. Identify tree, shrub, and herbaceous species to be planted, the source of the material, and the number and size of individual plants. Plant stock should be obtained from areas as near to the compensatory mitigation site as possible, to preserve the genetic integrity of the area. Plant understory species during the initial site planting (typical) or at a later date when the canopy cover has reached a specified level. If the understory is planted later (atypical), it might be necessary to fell a few trees to create openings in the canopy for these new plants to survive. The Corps strongly recommends felled trees remain at the mitigation site (along the ground) to serve as a source of decaying coarse woody debris, which is important to systemic nutrient cycling. Vegetation should be planted in clusters and islands emulating regional reference (i.e., high-functioning) sites; they should not be planted in rows nor spaced at regular distances.

In addition to plant types, the proposed irrigation strategy should consider soil type(s), hydrology, and other relevant factors. Develop a plan to wean plants from irrigation (if irrigation is required to establish plants) and a monitoring scheme to maintain plant hydration. Examine the possibility of mixing lower-cost plant material (cutting of local plants) with a small number of larger container stock to develop vertical heterogeneity (strata). These recommendations are designed to avoid the establishment of tree farms (e.g., large numbers of same-age trees planted in regular rows on six-foot centers).

f. *Propose realistic success criteria based on the purpose of the compensatory mitigation, design of the site, and functional assessment criteria*. Develop measurable, realistic success criteria, consistent with the purpose and goals of the compensatory mitigation project, that are achievable by the end of the maintenance and monitoring period (generally five years after compensatory mitigation implementation, but longer periods may be required). Include measurable and realistic performance standards and what methods will be used to track progress toward achieving the approved success criteria. Commonly used success criteria in compensatory mitigation projects have included percent canopy cover, percent plant survival, percent of distinct native species, percent canopy cover of non-native species, plant heights, and occurrence/nesting of target wildlife species. Functional assessment criteria, such as HGM variables and functional algorithms, may also be used to evaluate compensatory mitigation progress and success. These criteria, when available, provide a reliable and objective means of evaluating the capacity of the area to perform ecosystem functions. Development of appropriate success criteria is the single most important element in the development of a successful compensatory mitigation monitoring program. Involve the Corps as early as possible to develop specific, measurable performance standards (to track progress during the maintenance and monitoring period) and success criteria. Example success criteria will

be posted on the Portland District Regulatory website (https://www.nwp.usace.army.mil/op/g/).

g. *Develop a Specific Maintenance and Monitoring Program Including Contingency Measures*. Detail how often and when the compensatory mitigation site will be monitored and by whom, and the dates monitoring reports will be provided to the Corps. Also provide specifics regarding the type and timing of maintenance activities at the compensatory mitigation site and the responsible parties. Describe the conditions that would necessitate the responsible parties to undertake contingency measures, and what sources of funding and alternate compensatory mitigation sites are available to ensure the required compensatory mitigation occurs successfully.

3. Once the applicant has developed a draft compensatory mitigation and monitoring plan using the items listed above, it should be submitted to the Corps for review. The Corps will evaluate the draft compensatory mitigation and monitoring plan for approval during permit processing. The Corps prefers the compensatory mitigation site be constructed prior to or concurrently with the project construction. If the compensatory mitigation project will not replace impacted functions and values until after project impacts, the Corps may increase the replacement ratio, to minimize temporal losses of functions and values associated with project impacts.

D. Compensatory Mitigation Site Construction

1. The applicant should not begin construction until the Corps approves the final compensatory mitigation and monitoring plan. Construction efforts for each individual compensatory mitigation site will be dependent on the size of the site, the type of compensatory mitigation (in general, establishment involves much more work than enhancement of existing habitat), the amount of earthwork required, and the complexity of the compensatory mitigation and monitoring plan. The major effort by the applicant during this phase of the project would be to monitor construction activities and to ensure all aspects of the compensatory mitigation and monitoring plan are completed without incident. This process will normally require on-site management of construction personnel by one or more of the applicant's representatives, who have complete knowledge of the compensatory mitigation and monitoring plan and some understanding of soil science, hydrology, botany, horticulture, or plant ecology. Sensitive areas should be staked or flagged to preclude unauthorized construction impacts. The permittee is responsible for the successful implementation of the compensatory mitigation project, and any significant deviations identified during construction must be approved by the Corps. The most important items that should be monitored include:

a. *Prior removal of exotic plant species during site preparation*. One of the major expenses during the maintenance phase of any compensatory mitigation project will be the continual battle against exotic plant species, as they invade the disturbed habitat. If the construction personnel remove the invasive plant material from the site during the initial grading instead of grading it under, there may be less need for intensive maintenance during later stages of the project.

b. *Monitor the planting strategy to ensure vegetation is not planted in linear rows at a regular distance and that onsite conditions will support the species planted over the long-term*. Many existing compensatory mitigation sites have the appearance of tree farms. These sites lack the complex habitat structure important to support a variety of wildlife and to perform hydrologic, biochemical, and habitat functions optimally. Ensure plant spacing at the compensatory mitigation site emulates what is observed at regional reference (i.e., high-functioning) sites. In addition, monitor the elevation of the different plant species and confirm these trees and shrubs are planted at the designed heights relative to the water source supporting them,

such as ground water. Confirm the plants are natural members of the surrounding community and not similar ornamental species. Confirm soil conditions (e.g., soil moisture, pH, salinity, organic matter, nitrogen, etc.) are within limits for species being planted.

c. *Monitor the construction activities to ensure habitat outside of the planned compensatory mitigation site is not impacted*. The use of heavy equipment may be needed to construct the site, and care must be taken to ensure equipment operators do not stray outside of the project boundaries. Brief the operators of heavy equipment on the location of sensitive habitat areas and the importance of avoidance.

E. Long-Term Compensatory Mitigation Site Maintenance and Monitoring

1. The maintenance and monitoring phase of the compensatory mitigation project begins immediately following grading and planting activities. This phase is crucial to the success of the project, as most compensatory mitigation projects do not develop as expected. Changes in hydrologic conditions, soil conditions, exotic plant species; invasions, disease or pest infestations of vegetation, wildlife browsing, and other problems can occur on newly established compensatory mitigation sites. Without a comprehensive maintenance and monitoring program, many of these minor problems can quickly spiral out of control and threaten the success of the compensatory mitigation site.

As discussed above, one of the most important issues with the maintenance and monitoring of compensatory mitigation sites is the ongoing control of invasive, non-native (or exotic) plant species. In Oregon, there are many invasive, non-native plant species that will readily colonize a recently disturbed site provided with extra water during the late spring and summer. A proactive program to remove invasive, exotic plants upon discovery would result in higher habitat functions on compensatory mitigation sites. It would also be less costly for the applicant to conduct these removal activities before the density of invasive species becomes a serious problem. Bi-weekly or monthly inspections of the site during the spring and early summer would allow removal of the immature exotic plants before reproduction and creation of a much larger problem. In many situations, the site is initially free of exotics, but an adjacent infested property acts as a source of seeds or propagules that continually invade the site.

2. An important aspect of the maintenance and monitoring phase of compensatory mitigation projects is ensuring appropriate depth, duration, and timing of water delivery to the site. For riparian compensatory mitigation sites, water availability can be monitored by noting flow in the channel, frequency and level of overbank flooding, length of soil saturation or inundation, and the groundwater levels throughout the year. For these systems, the amount of water and its seasonal availability is important to the type of habitat to be restored, enhanced, and/or established. Monthly monitoring (or even bi-weekly) of the site during the first two years may provide important information on site hydrodynamics to determine whether onsite vegetation communities will be stressed or die-off over the long term. It is recommended the applicant compare hydrologic information at the compensatory mitigation site to reference (i.e., high-functioning) sites in the region.

III. MONITORING REQUIREMENTS

1. Monitoring reports will be required and identified as a special condition for every permit requiring compensatory mitigation. Written as formal conditions of Corps permits, monitoring reports will be subject to formal compliance efforts. Failure to submit complete and timely monitoring reports may result in an enforcement action by the Corps.

2. The permitee shall provide a baseline report to the Corps no later than December 31 of the year mitigation work is completed. The baseline report shall include “as-built” drawings depicting all

grading and plant installation in electronic format or hardcopy. The permitee shall provide annual monitoring reports to the Corps no later than December 31 of the year after the baseline report is due.

While monitoring reports will generally be required on an annual basis, a Corps Project Manager may require more frequent submittals of monitoring reports for specific projects. If a problem is identified within a monitoring report, the appropriate Corps Project Manager can schedule a site visit to determine the extent of the problem and to identify remedial measures. A sample monitoring report will be available on the Portland District Regulatory website at https://www.nwp.usace.army.mil/op/g/.

The Corps recommends the following outline for the monitoring report:

A. Project Information

1. Project Name;
2. Permittee name, address, and phone number;
3. Consultant name, address, and phone number (for permit application, if necessary);
4. Corps permit file number;
5. Acres of impact and type(s) of habitat impacted;
6. Monitoring year (i.e. year 2 of 5);
7. Location of the project and directions to site (including latitude/longitude or UTM coordinates);
8. Date of the report and the corresponding permit conditions pertaining to the compensatory mitigation;
9. Amount and information on any required performance bond or surety.

B. Compensatory Mitigation Site Information

1. Location and directions to the site (including latitude/longitude or UTM coordinates);
2. Maps of mitigation site, including permanent landmarks and wetland and water boundaries;
3. Size and type(s) of habitat existing at the site and proposed for restoration, enhancement, establishment (creation), and/or preservation;
4. Specific purpose/goals for the compensatory mitigation site;
5. Date site construction and planting completed (fully implemented);
6. Dates of monitoring inspections;
7. Name, address, and contact number of responsible parties for the site;
8. Name, address, and contact number for designer.

C. Brief Summary of Remedial Action(s) and Maintenance of the Compensatory Mitigation Site

D. Map of the compensatory mitigation site. The 8.5” x 11” diagram of the site should include the following:

1. Habitat types (as constructed)
2. Locations of photographic record stations
3. Landmarks
4. Inset defining location of the site

E. List of success criteria from Corps permit.

F. Table of results from the monitoring visits versus performance standards for specified target dates.

G. Photographic record of the site during most recent monitoring visit at record stations.

H. Summary of field data taken to determine compliance with performance standards and success criteria.

I. Summary of any significant events occurring on the site that may affect the ultimate success of the compensatory mitigation project.

The Corps recognizes there may be cases where this outline would not be practical (for very small, large, or complex compensatory mitigation projects). However, in the majority of cases, this outline should be followed. The Corps Project Manager processing the application can assist the applicant to determine whether deviations from the above outline are appropriate. In all cases, the completed monitoring reports should be submitted unbound to the Corps for inclusion into the official case file. Electronic copies of monitoring reports may also be submitted in place of a hardcopy.

IV. COMPLETION OF COMPENSATORY MITIGATION

The permittee should notify the Corps in writing when the monitoring period is complete and the success criteria from the Corps permit have been met. When applicable, a formal jurisdictional delineation of established wetlands should be submitted with the report (this delineation shall be accompanied by legible copies of all field data sheets). If wetlands are not established, a delineation of non-wetland waters of the U.S. and other areas enhanced, restored, established, or preserved as part of the compensatory mitigation program shall be submitted to the Corps.

V. CONTINGENCY MEASURES

There are many factors that may positively or negatively influence aquatic resources and the functions they provide, such as urbanization, farming, or grazing. Wetlands and other aquatic resources are often subject to a wide range and frequency of events such as floods, fires and ice storms. As with all natural systems, some things are beyond control. Well-crafted mitigation plans, however, recognize the likelihood of these events and attempt to plan for them, primarily through monitoring and adaptive management. In addition, it is important to realize the mobile nature of wetlands and streams. They change over time and over the landscape in response to internal and external forces.

Monitoring and adaptive management should be used to evaluate and adjust maintenance (e.g., predator control, irrigation), and design remedial actions. Adaptive management should consider changes in ecological patterns and processes, including biodiversity of the mitigation project as it evolves or goes through successional stages. Trends in the surrounding area must also be taken into account (i.e., landscape/watershed context). Being proactive helps ensure the ultimate success of the mitigation, and improvement of the greater landscape.

A brief discussion of the following items shall be part of each annual and the final compensatory mitigation monitoring report, unless the compensatory mitigation site is achieving or has achieved all articulated success criteria:

A. If one or more success criteria of the Corps permit is not met for all or any portion of the compensatory mitigation project in any year, the Corps may pursue an enforcement action pursuant to 33 CFR 326. The applicant shall prepare an analysis of the cause(s) of failure(s) and propose remedial actions for approval. The responsible party's maintenance and monitoring obligations shall continue until the Corps gives final approval the compensatory mitigation obligations have been satisfied.

B. Alternative Locations for Contingency Compensatory Mitigation. Indicate specific alternative compensatory mitigation locations available for use in the event compensatory mitigation cannot be successfully achieved at the intended compensatory mitigation site. Include current ownership information, if offsite.

C. Funding Mechanism. Indicate what funds will be available to pay for planning, implementing, maintaining, and monitoring of any contingency measures that may be required to achieve compensatory mitigation goals.

D. Responsible Parties. List names, addresses, and phone numbers of persons/entities responsible for implementing, maintaining, and monitoring contingency measures.

VI. REFERENCES

Adamus P.R. and D. Field. 2001. Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites. I. Willamette Valley Ecoregion, Riverine Impounding and Slope/Flats Subclasses. Volume IA: Assessment Methods. Oregon Division of State Lands, Salem, OR.

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Rheinhardt, R.D., M.M. Brinson, P.M. Farley. 1997. Applying wetland reference data to functional assessment, mitigation, and restoration. *Wetlands*. 17(2):195-215.

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